PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

CRAFT, Jeffrey, F.
Sonnenschein Nath & Rosenthal
Suite 1500
601 S. Figueroa Street
Los Angeles, CA 90017
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year) 03 September 2001 (03.09.01)	
Applicant's or agent's file reference FARML-044935	**IMPORTANT NOTIFICATION**
International application No. PCT/US00/14818	**International filing date** (day/month/year) 26 May 2000 (26.05.00)

1. The following indications appeared on record concerning:

[ ] the applicant [ ] the inventor [X] the agent [ ] the common representative

Name and Address

CRAFT, Jeffrey, F.
Pretty & Schroeder
19th floor
444 South Flower Street
Los Angeles, CA 90071
United States of America

State of Nationality:
State of Residence:
Telephone No.: (213)622-7700
Facsimile No.: (213)489-4210
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [ ] the name [X] the address [ ] the nationality [ ] the residence

Name and Address

CRAFT, Jeffrey, F.
Sonnenschein Nath & Rosenthal
Suite 1500
601 S. Figueroa Street
Los Angeles, CA 90017
United States of America

State of Nationality:
State of Residence:
Telephone No.: (213) 623-9300
Facsimile No.: (213) 623-9924
Teleprinter No.:

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland** Facsimile No.: (41-22) 740.14.35	Authorized officer François BAECHLER Telephone No.: (41-22) 338.83.38

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/14818

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K38/40 C07K14/79 A23L3/3463 B65D81/28 A23L3/3526

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61K C07K A23B A23L B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, BIOSIS, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Week 9832 Derwent Publications Ltd., London, GB; AN 1998-375525 XP002149568 & RU 2 099 065 A (MOSC ONCOLOGICAL RES INST), 20 December 1997 (1997-12-20) abstract --- -/--	1-3,5, 18-20, 22,88, 104

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 February 2001	20.02.01

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax (+31–70) 340–3016	Heezius, A

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	WO 91 13982 A (FERRODYNAMICS INCORPORATED) 19 September 1991 (1991-09-19)	1,2,5, 18,19, 22,31, 56,57, 88,89, 95,96, 99-104
Y	claims 21,23,28 page 6, line 28 -page 7, line 7 page 7, line 30 -page 8, line 17 page 8, line 23 -page 9, line 14 page 9, line 17 - line 24	97,98
Y	GB 443 911 A (CALIFONIA FRUIT GROWERS EXCHANGE) 3-1936 claims 1-6	97,98
X	US 5 206 156 A (SAMAIN ET AL.) 27 April 1993 (1993-04-27) 435/101 claims 1,3,10 column 4, line 39 - line 55	1,2,5, 18,19, 22,31,56
X	EP 0 753 308 A (GAMBIT INTERNATIONAL LIMITED TORTOLA (VG)) 15 January 1997 (1997-01-15) claims 1-4,6-10 page 3, line 34 -page 4, line 4; examples 5-8	1,5,11, 12,18, 22,28, 29,31, 32,88, 94,95, 104
X	EP 0 753 309 A (GAMBIT INTERNATIONAL LIMITED TORTOLA (VG)) 15 January 1997 (1997-01-15) claims 1,2,6-10 page 4, line 20 - line 40 examples 4-10	1,5,11, 12,18, 22,28, 29,31, 88,94, 95,104
P,X	US 6 066 469 A (KRUZEL ET AL.) 23 May 2000 (2000-05-23) 435/69.1 column 5, line 49 -column 9, line 39	1,2,5, 18,19, 22,31, 32,38, 39,56, 57,88, 89,95, 96, 99-104

-/--

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 389 795 A (MORINAGA MILK INDUSTRY CO LTD) 3 October 1990 (1990-10-03) claims 1-5; examples 3,4	1,5, 11-13, 18,22, 28-31, 56,68, 88,95, 104
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 03, 29 March 1996 (1996-03-29) & JP 07 300425 A (SNOW BRAND MILK PROD CO LTD), 14 November 1995 (1995-11-14) abstract	1,5,18, 22,31, 56,104
X	EP 0 629 347 A (MORINAGA MILK INDUSTRY CO LTD) 21 December 1994 (1994-12-21)	1,2,5, 11,12, 18,19, 22,28, 31,32, 56,57, 104
A	page 6, line 23 - line 42; claims 1,24,5,7,8,9,12,14	96-103

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/14818

Box I Observations where certain claims were found unsearchable (Continuation f item 1 of first sheet)

This International Search Report has not be n established in respect of certain claims under Articl 17(2)(a) for the foll wing r asons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

R mark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-95

A composition of matter comprising a defined dispersion of lactoferrin immobilized on a naturally occurring substrate via the N-terminus region of the lactoferrin.

2. Claims: 96-104

A method of inhibiting the growth and/or adhesion of a microbial species on a foodstuff, comprising treating a food-contacting surface of a material for food packaging or food handling with an immobilized lactoferrin, and contacting a foodstuff with said surface, whereby the growth and/or adhesion of a microbial species on said foodstuff is inhibited.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 00/14818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
RU 2099065 A	20-12-1997	NONE	
WO 9113982 A	19-09-1991	AU 7453391 A	10-10-1991
		US 6066469 A	23-05-2000
GB 443911 A		NONE	
US 5206156 A	27-04-1993	FR 2646777 A	16-11-1990
		AT 96680 T	15-11-1993
		CA 2014847 A	12-11-1990
		DE 69004329 D	09-12-1993
		DE 69004329 T	19-05-1994
		EP 0397227 A	14-11-1990
		ES 2059990 T	16-11-1994
		JP 3003045 B	24-01-2000
		JP 3193708 A	23-08-1991
		KR 149997 B	15-10-1998
EP 753308 A	15-01-1997	IT RM950473 A	13-01-1997
		CA 2180689 A	13-01-1997
		US 5834424 A	10-11-1998
EP 753309 A	15-01-1997	IT RM950472 A	13-01-1997
		CA 2180683 A	13-01-1997
US 6066469 A	23-05-2000	AU 2436095 A	29-11-1995
		WO 9530339 A	16-11-1995
		AU 7453391 A	10-10-1991
		WO 9113982 A	19-09-1991
EP 0389795 A	03-10-1990	JP 2191205 A	27-07-1990
		JP 2564185 B	18-12-1996
		CA 2010776 A	25-08-1990
		DE 69002024 D	29-07-1993
		DE 69002024 T	18-11-1993
		DK 389795 T	02-08-1993
		US 5296464 A	22-03-1994
JP 07300425 A	14-11-1995	JP 2832517 B	09-12-1998
EP 0629347 A	21-12-1994	JP 5320067 A	03-12-1993
		AU 665381 B	04-01-1996
		DE 69220679 D	07-08-1997
		DE 69220679 T	23-10-1997
		US 5656591 A	12-08-1997
		AU 2956492 A	01-09-1993
		CA 2128612 A	05-08-1993
		DK 629347 T	16-02-1998
		WO 9314640 A	05-08-1993
		JP 5310594 A	22-11-1993

PATENT COOPERATION TREATY

REC'D 08 OCT 2001

WIPO PCT

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference FARML-044935	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US00/14818	International filing date *(day/month/year)* 26 MAY 2000	Priority date *(day/month/year)* 28 MAY 1999
International Patent Classification (IPC) or national classification and IPC Please See Supplemental Sheet.		
Applicant NAIDU, A. SATYANARAYAN		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets.

   ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   I [X] Basis of the report

   II [ ] Priority

   III [ ] Non-establishment of report with regard to novelty, inventive step or industrial applicability

   IV [ ] Lack of unity of invention

   V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement

   VI [ ] Certain documents cited

   VII [X] Certain defects in the international application

   VIII [X] Certain observations on the international application

Date of submission of the demand	Date of completion of this report
28 DECEMBER 2000	12 SEPTEMBER 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer JEFFREY E. RUSSEL Telephone No. (703) 308-0196

Form PCT/IPEA/409 (cover sheet) (July 1998) ★

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US00/14818

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:
pages (See Attached) , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the claims:
pages (See Attached) , as originally filed
pages _____ , as amended (together with any statement) under Article 19
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the drawings:
pages (See Attached) , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the sequence listing part of the description:
pages (See Attached) , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the writen sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

☒ the description, pages NONE

☒ the claims, Nos. NONE

☒ the drawings, sheets/~~fig~~ NONE

5. ☒ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

***Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US00/14818

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step r industrial applicability; citati ns and explanations supporting such statement

1. statement

Novelty (N)	Claims	(Please See supplemental sheet)	YES
	Claims	(Please See supplemental sheet)	NO
Inventive Step (IS)	Claims	(Please See supplemental sheet)	YES
	Claims	(Please See supplemental sheet)	NO
Industrial Applicability (IA)	Claims	(Please See supplemental sheet)	YES
	Claims	(Please See supplemental sheet)	NO

2. citations and explanations (Rule 70.7)

Claim 104 lacks novelty under PCT Article 33(2) as being anticipated by Mosc Oncological Res Inst. Mosc Oncological Res Inst teaches a gel comprising lactoferrin, gelatin, and Na phosphate buffer. Because the same components are present in the same defined dispersion, inherently the lactoferrin in the gel of Mosc Oncological Res Inst will be immobilized via its N-terminus to the gelatin to the same extent claimed by Applicant. With respect to instant claim 104, an intended use limitation does not impart novelty or nonobviousness to a composition claim which is otherwise anticipated by or obvious over the prior art.

Claims 1-3, 5, 18, 19, 22, 31-37, 56, 57, and 104 lack novelty under PCT Article 33(2) as being anticipated by Ferrodynamics Incorporated. Ferrodynamics Incorporated teaches lactoferrin in combination with stearic acid, which is a lipid. The composition is used as an antiseptic in powder, solution, ointment, aerosol spray, or cream form, and can be applied to food. See, e.g., page 7, line 30 - page 9, line 24. Because the same components are present in the same defined dispersion, inherently the lactoferrin in the composition of Ferrodynamics Incorporated will be immobilized via its N-terminus to the stearic acid to the same extent claimed by Applicant. With respect to instant claims 31-37, because the same composition is being contacted with the same food surfaces, inherently contamination by the same microbes will be reduced to the same extent in Ferrodynamics Incorporated as is claimed Applicant.

Claims 38, 39, 58, 62, 64, 65, 68, and 88-103 lack an inventive step under PCT Article 33(3) as being obvious over Ferrodynamics Incorporated. Application of Ferrodynamics Incorporated is the same as in the immediately preceding paragraph. Ferrodynamics Incorporated does not teach a lactoferrin concentration for its antiseptics, and does not teach applying its antiseptics to Applicant's particularly claimed foods or food-handling surfaces. It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to determine all operable and optimal amounts for the lactof errin in the antiseptics of Ferrodynamics Incorporated because the amount of an active (Continued on Supplemental Sheet.)

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claim 10 is objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or contents thereof: At claim 10, line 2, "wdvol" should be changed to "wt/vol".

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 4 and 6-10 are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because the claims are indefinite for the following reason(s): At claim 6, line 1, the term "defined" is indefinite, because it is unclear what distinguishes a defined dispersion from an undefined dispersion. The term is described at page 12, lines 4-5, of the description, but the description does not indicate what or how the ingredients or components, or their amounts, are to be selected. The term has no art-recognized definition. The phrase "galactose-rich" in claim 4 is indefinite because "galactose-rich" is a relative term, but no standard of reference has been provided with which to determine whether or not a particular polysaccharide is "galactose-rich" or not and therefore embraced within the scope of the claims. The phrase is not defined either in the description or the art. While the description provides one example of a galactose-rich polysaccharide (see page 10, lines 23-34), an example does not constitute a definition.

Supplemental B x
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

CLASSIFICATION:
The International Patent Classification (IPC) and/or the National classification are as listed below:
IPC(7): A23L 3/3463, 3/3526; A61K 38/40; B65D 81/28; C07K 14/79 and US Cl.: 422/28, 32; 426/310, 322, 326, 332, 335, 532; 514/6, 8, 21

I. BASIS OF REPORT:

This report has been drawn on the basis of the description,
page(s) 1-40, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the claims,
page(s) 46, 47, and 49, as originally filed.
page(s) NONE, as amended under Article 19.
page(s) NONE, filed with the demand.
and additional amendments:
Pages 41-45, 48, 50, and 51, filed with the letter of 30 July 2001

This report has been drawn on the basis of the drawings,
page(s) NONE, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the sequence listing part of the description:
page(s) NONE, as originally filed.
pages(s) NONE, filed with the demand.
and additional amendments:
NONE

5. (Some) amendments are considered to go beyond the disclosure as filed:
The amendment of the description filed 28 December 2000 is objected to under PCT Article 34(2)(b) because it adds matter into the application that goes beyond the disclosure as originally filed. The added matter which is new is as follows: The additional description of commercially available products at page 10; the elaboration on the procedures reported in the examples at pages 33-40b; and the two new examples at pages 40c-40e; are new matter. The new subject matter is not described, either using equivalent terminology or inherently, in the disclosure as originally filed. Also, page 24a would result in duplication of the text at page 23, lines 28-36, of the disclosure.

V. 1. REASONED STATEMENTS:
The report as to Novelty was positive (YES) with respect to claims 4, 6-17, 20, 21, 23-30, 38-55, and 58-103.
The report as to Novelty was negative (NO) with respect to claims 1-3, 5, 18, 19, 22, 31-37, 56, 57, and 104.
The report as to Inventive Step was positive (YES) with respect to claims 4, 6-17, 20, 21, 23-30, 40-55, 59-61, 63, 66, 67, and 69-87.
The report as to Inventive Step was negative (NO) with respect to claims 1-3, 5, 18, 19, 22, 31-39, 56-58, 62, 64, 65, 68, and 88-104.
The report as to Industrial Applicability was positive (YES) with respect to claims 1-104.
The report as to Industrial Applicability was negative (NO) with respect to claims NONE.

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):
substance is an art-recognized result-effective variable which is routinely determined and optimized in the antiseptic and chemical arts. It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to apply the antiseptic compositions of Ferrodynamics Incorporated to any food or food-handling surface, including those specifically claimed by Applicant, because these are known foods and food-handling surfaces which one of ordinary skill in the

Supplemental B x
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

art would desire to decontaminate, and because the antiseptic compositions of Ferrodynamics Incorporated are disclosed to have general utility and would not have been expected to be limited to the decontamination of any particular type of surface.

Claims 4, 6-17, 20, 21, 23-30, 40-55, 59-61, 63, 66, 67, and 69-87 meet the criteria set out in PCT Article 33(2)-(3). With respect to instant claims 4 and 11-13, the prior art of record does not teach or suggest isolated lactoferrin immobilized on a galactose-rich polysaccharide or combined with a buffer system. The lactoferrin of Harper et al is present in its natural state rather than in an isolated state, and the prior art of record does not provide any motivation to isolate lactoferrin from milk and then recombine it with a galactose-rich polysaccharide or with a buffer. With respect to instant claims 6-10, 14-17, 23-27, 40-55, 59-61, 63, 66, and 67, the prior art of record does not teach or fairly suggest the claimed compositions comprising a mixture of immobilized lactoferrin and native lactoferrin. Because of the relatively large amount of milk components present in milk which would be expected to immobilize lactoferrin, there would be no expectation in the art that milk would contain any native lactoferrin. Concerning Mosc Oncological Res Inst and Ferrodynamics Incorporated, the references do not teach using a combination of immobilized and naturally occurring lactoferrin, and do not provide any motivation to use such a mixture. With respect to instant claims 20, 21, and 28-30, Ferrodynamics Incorporated does not teach or suggest the desirability of including the claimed components in the disclosed antiseptic compositions.

Claims 1-104 meet the criteria set out in PCT Article 33(4). The claimed invention would have been expected to have industrial applicability in preventing or inhibiting the growth or adhesion of microbes.

Applicant's comments contained in the letter filed 30 July 2001 have been carefully considered but are not deemed to be persuasive. With respect to claim 104 and Mosc Oncological Res Inst, Applicant has not explained what compositional requirements the terms "antimicrobial cleanser", "polish", "paint", "spray", "soap", or "detergent" impose on the claim in order to distinguish over the gel of Mosc Oncological Res Inst. A gel can be used as an "antimicrobial cleanser", "polish", "paint", "spray", "soap", or "detergent"; it is the method of use, not the composition per se, which distinguishes an antimicrobial cleanser, polish, paint, spray, soap, or detergent from a gel. The claim is directed towards a composition, not a method of use. With respect to Ferrodynamics Incorporated, there is no indication in the disclosure or claims that any special steps are required to immobilize lactoferrin on a naturally occurring substrate. By all indications, simple mixing is sufficient to cause immobilization. See, e.g., page 11, lines 3-5, of the disclosure.

---------- NEW CITATIONS ----------

US 4,791,193 A (OKONOGI et al) 13 December 1988, see column 1, lines 11-25.

HARPER et al. Dairy Technology And Engineering. Westport: The AVI Publishing Company, Inc. 1976, pages 20-23 and 28-37, see entire document.

NAIDU et al. Milk Lactoferrin - Natural Microbial Blocking Agent (MBA) For Food Safety. Environmental & Nutritional Interactions. 1998, Volume 2, pages 35-50, especially the paragraph bridging pages 38 and 39, and page 45, first full paragraph.

Not entered
Claims 74 - 84
are missing from
the amended pages

PCT/US 00/14811
IPEA/US 30 JUL 200

CLAIMS

1. A composition of matter comprising a dispersion of isolated lactoferrin immobilized on a naturally occurring substrate not including gelatin via the N-terminus region of the lactoferrin.

2. The composition in accordance with claim 1, wherein the naturally occurring substrate not including gelatin is a protein, a polysaccharide, cellulose, a nucleic acid, a nucleotide, or a lipid.

3. The composition in accordance with claim 1, wherein the naturally occurring substrate not including gelatin is collagen, fibronectin, casein, mucin, heparan-sulfate, carrageenan, deoxyribonucleic acid, adenosine triphosphate or a triglyceride.

4. The composition in accordance with claim 1, wherein the naturally occurring substrate not including gelatin is a galactose-rich polysaccharide.

5. The composition of claim 1, wherein the dispersion is an aqueous solution, an aqueous emulsion, a colloid, a suspension, a powder, or a granular solid.

6. A composition of matter comprising a defined dispersion of lactoferrin immobilized on a naturally occurring substrate via the N-terminus region of the lactoferrin, and native lactoferrin.

7. The composition in accordance with claim 6, wherein the concentration of immobilized lactoferrin and native lactoferrin in the dispersion is from about 0.05% wt/vol to about 2.5 % wt/vol.

8. The composition in accordance with claim 6, wherein the molar ratio of immobilized lactoferrin to native lactoferrin is a ratio of from about 1:1 to about 1:10.

9. The composition in accordance with claim 6, wherein the molar ratio of immobilized lactoferrin to native lactoferrin is a ratio of from about 1:1 to about 1:5.

10. The composition in accordance with claim 6, wherein the composition comprises about 1 % wdvol immobilized lactoferrin and about 1 % wt/vol native lactoferrin.

11. The composition in accordance with claim 1, wherein the composition further comprises a buffer system.

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12. The composition in accordance with claim 11, wherein the buffer system contains a physiologically acceptable acid, a physiologically acceptable base, and a physiologically acceptable salt.

13. The composition in accordance with claim 12, wherein the physiologically acceptable acid is oxalic acid, ethylenediamine tetraacetic acid, carbonic acid, or citric acid; the physiologically acceptable base is sodium biearbonate, potassium bicarbonate, sodium carbonate, or potassium carbonate; and the physiologically acceptable salt is calcium chloride, potassium chloride or sodium chloride.

14. A composition of matter comprising an aqueous buffer solution containing a physiologically acceptable acid selected from the group consisting of oxalic acid, ethylenediamine tetraacetic acid, carbonic acid, and citric acid; a physiologically acceptable base; and a physiologically acceptable salt selected from the group consisting of calcium chloride, potassium chloride, and sodium chloride, wherein the ratio of acid to base to salt is 0.1 to 0.0001M (acid) : 1 to 0.001M (base) : 10 to 0.01M (salt) and containing a mixture of native lactoferrin and lactoferrin immobilized on a galactose-rich polysaccharide comprising mainly galactose residues and derivatized galactose residues, collagen, gelatin, fibronectin, casein, mucin, heparan-sulfate, carrageenan, deoxyribonucleic acid, adenosine triphosphate or a triglyceride via the N-terminus region of the lactoferrin, in a native lactoferrin to immobilized lactoferrin molar ratio of from about 1:1 to about 1:5 and in a concentration of from about 0.001 to about 2.5 % wt/vol.

15. The composition in accordance with claim 14, wherein the lactoferrin is immobilized on a galactose-rich polysaccharide comprising mainly galactose residues and derivatized galactose residues.

16. The composition in accordance with claim 14, wherein the mixture comprises about 1 % wt/vol immobilized lactoferrin and about 1 % wt/vol native lactoferrin.

17. The composition in accordance with claim 14, wherein the physiologically acceptable acid is citric acid, the physiologically acceptable base is sodium bicarbonate and the physiologically acceptable salt is sodium chloride.

18. A method for reducing the microbial contamination of a composition subject to microbial contamination by a microbe, comprising: treating the composition with a sufficient amount of isolated lactoferrin immobilized on a naturally occurring substrate via the N-terminus region of the lactoferrin to reduce microbial.

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contamination

19. The method in accordance with claim 18, wherein the naturally occurring substrate is a protein, a polysaccharide, cellulose, a nucleic acid, a nucleotide or a lipid.

20. The method in accordance with claim 18, wherein the naturally occurring substrate is collagen, gelatin, fibronectin, casein, mucin, heparan-sulfate, carrageenan, deoxyribonucleic acid, adenosine triphosphate or a triglyceride.

21. The method in accordance with claim 18, wherein the naturally occurring substrate is a galactose-rich polysaccharide comprising mainly galactose residues and derivatized galactose residues.

22. The method of claim 18, wherein the composition is an aqueous solution, an aqueous emulsion, a colloid, a suspension, a powder, or a granular solid.

23. The method in accordance with claim 18, further comprising applying a composition containing a mixture of immobilized lactoferrin and native lactoferrin.

24. The method in accordance with claim 23, wherein the concentration of the mixture in the composition is from about 0.001 to about 2.5% wt/vol.

25. The method in accordance with claim 23, wherein the molar ratio of immobilized lactoferrin to native lactoferrin in the mixture is in a ratio of from about 1:1 to about 1:10.

26. The method in accordance with claim 23, wherein the molar ratio of immobilized lactoferrin to native lactoferrin in the mixture is in a ratio of from about 1:1 to about 1:5.

27. The method in accordance with claim 23, wherein the mixture comprises about 1 % wt/vol immobilized lactoferrin and about 1% wt/vol native lactoferrin.

28. The method in accordance with claim 18, wherein the aqueous solution further comprises a buffer system.

29. The method in accordance with claim 28, wherein the buffer system contains a physiologically acceptable acid, a physiologically acceptable base, and a physiologically acceptable salt.

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30. The method in accordance with claim 29, wherein the physiologically acceptable acid is oxalic acid, ethylenediamine tetraacetic acid, carbonic acid, or citric acid; the physiologically acceptable base is sodium bicarbonate, potassium bicarbonate, sodium carbonate, or potassium carbonate; and the physiologically acceptable salt is calcium chloride, potassium chloride or sodium chloride.

31. The method of claim 18, wherein the microbe is bacterium, a fungus, a protozoan, or a virus.

32. The method in accordance with claim 18, wherein the microbe is enterotoxigenic *Escherichia coli*, enteropathogenic *Escherichia coli*, *Shigella dysenteriae*, *Shigella flexneri*, *Salmonella typhimurium*, *Salmonella typhi*, *Salmonella abony*, *Salmonella dublin*, *Salmonella enteritidis*, *Salmonella hartford*, *Salmonella kentucky*, *Salmonella panama*, *Salmonella pullorum*, *Salmonella rostock*, *Salmonella thompson*, *Salmonella virschow*, *Enterobacter aerogenes*, *Vibrio cholerae*, *Yersinia enterocolitica*, *Campylobacter jejuni*, *Aeromonas hydrophila*, *Staphylococcus aureus*, *Staphylococcus hyicus*, *Staphylococcus epidermidis*, *Staphylococcus hominis*, *Staphylococcus warneri*, *Staphylococcus xylosus*, *Staphylococcus chromogenes*, *Streptococcus pyogenes*, *Streptococcus pneumoniae*, *Streptococcus mutans*, *Streptococccus sanguis*; *Pediococcus acne*, *Bacillus cereus*, *Bacillus anthracis*, *Bacillus subtilis*, a *Brucella* species, *Listeria monocytogenes*, *Legionella pneumophila*, *Bordetella pertussis*, *Pseudomonas aeruginosa*, *Legionella pneumophila*, *Francisella tularensis*, *Candida albicans*, *Brochothrix thermospacta*, *Bacillus pumilus*, *Enterococcus faecium*, *Actinobacillus actinomycetemcomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia*, *Deinococcus radiopugnans*, *Deinococcus radiodurans*, *Deinobacter grandis*, *Acinetobacter radioresistens*, or *Methylobacterium radiotolerans*.

33. The method in accordance with claim 18, wherein the microbe is a verotoxic *Escherichia coli*.

34. The method in accordance with claim 33, wherein the verotoxic *Escherichia coli* is the serotype 0157:H7.

35. The method of Claim 18, wherein the microbe is a *Clostridium* species.

36. The method of Claim 35, wherein species is *Clostridium perfringens*, *Clostridium difficile*, *Clostridium botulinum*, or *Clostridium tetani*.

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37. The method of Claim 18, wherein the microbe is a protozoan selected from the group consisting of *Entamoeba histolytica*, *Naegleria flowleri*, *Giardia lamblia*, *Leishmania spp.*, *Trichomonas vaginalis*, *Trypanosoma spp.*, *Plasmodium spp.*, or *Taxoplasma spp.*

38. The method in accordance with claim 18, wherein the concentration of lactoferrin on the surface of the composition subject to microbial contamination is from about 0.0001 to about 10 mg /sq.inch.

39. The method in accordance with claim 38, wherein the concentration lactoferrin on the surface of the composition subject to microbial contamination is from about 0.01 to about 1 mg/sq. inch.

40. A method for inhibiting the microbial contamination of a composition subject to microbial contamination comprising treating the composition with an aqueous buffer solution containing a physiologically acceptable acid selected from the group consisting of oxalic acid, ethylenediamine tetraacetic acid, carbonic acid, and citric acid; a physiologically acceptable base; and a physiologically acceptable salt selected from the group consisting of calcium chloride, potassium chloride, and sodium chloride, wherein the ratio of acid to base to salt is 0.1 to 0.0001M (acid): 1 to 0.001M (base): 10 to 0.01M (salt) and containing a mixture of native lactoferrin and lactoferrin immobilized on a galactose-rich polysaccharide comprising mainly galactose residues and derivatized galactose residues, collagen, gelatin, fibronectin, casein, mucin, heparan-sulfate, carrageenan, deoxyribonucleic acid, adenosine triphosphate or a triglyceride via the N-terminus region of the lactoferrin, in a native lactoferrin to immobilized lactoferrin molar ratio of from about 1:1 to about 1:5 and in a concentration of from about 0.001 to about 2.5 % wt/vol.

41. The method in accordance with claim 40, wherein the lactoferrin is immobilized on galactose-rich polysaccharide comprising mainly galactose residues and derivatized galactose residues.

42. The method in accordance with claim 40, wherein the mixture comprises about 1% wt/vol immobilized lactoferrin and about 1 % wt/vol native lactoferrin.

43. The method in accordance with claim 40, wherein the physiologically acceptable acid is citric acid, the physiologically acceptable base is sodium bicarbonate and the physiologically acceptable salt is sodium chloride.

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65. The method of claim 64, wherein the aquatic organism is a fish, mollusk, or crustacean.

66. The method of claim 59, wherein the foodstuff comprises a surface and/or flesh of a marine or freshwater aquatic organism.

67. The method of claim 66, wherein the aquatic organism is a fish, mollusk, or crustacean.

68. The method of claim 56, wherein the foodstuff comprises a vegetable foodstuff.

69. The method of claim 59, wherein the composition comprises a vegetable foodstuff.

70. A method for reducing the microbial contamination of a meat product subject to microbial contamination by a microbe, comprising: applying to the meat product a composition containing a physiologically acceptable acid selected from the group consisting of oxalic acid, ethylenediamine tetraacetic acid, carbonic acid, and citric acid; a physiologically acceptable base; and a physiologically acceptable salt selected from the group consisting of calcium chloride, potassium chloride, and sodium chloride, wherein the molar ratio of acid to base to salt is 0.1 to 0.0001 (acid) : 1 to 0.001 (base) : 10 to 0.01 (salt) and containing a mixture of native lactoferrin and lactoferrin immobilized on a galactose-rich polysaccharide comprising mainly galactose residues and derivatized galactose residues, collagen, gelatin, fibronectin, casein, mucin, heparan-sulfate, carrageenan, deoxyribonucleic acid, adenosine triphosphate or a triglyceride via the N-terminus region of the lactoferrin, in a native lactoferrin to immobilized lactoferrin molar ratio of from about 1:1 to about 1:5 and in a concentration of from about 0.001 to about 2.5 % wt/vol.

71. The method of claim 70, wherein the composition is an aqueous solution, an aqueous emulsion, a colloid, a suspension, a powder, or a granular solid.

72. The method in accordance with claim 70, wherein the lactoferrin is immobilized on a galactose-rich polysaccharide comprising mainly galactose residues and derivatized galactose residues.

73. The method in accordance with claim 70, wherein the mixture comprises about 1% wt/vol immobilized lactoferrin and about 1 % wt/vol native lactoferrin.

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85. The method in accordance with claim 70, wherein the concentration of lactoferrin on the surface of the meat product is from about 0.01 to about 1 mg/sq. inch.

86. The method in accordance with claim 70, wherein the meat product is a beef product, a pork product, or a poultry product.

87. The method of claim 70, wherein the meat product is veal, lamb, sheep, goat, elk, deer, antelope, horse, or dog.

88. A foodstuff, containing: isolated lactoferrin immobilized on a naturally occurring substrate via the N-terminus region of the lactoferrin in a concentration between about 0.0001 and about 10 mg per gram of the foodstuff.

89. The foodstuff in accordance with claim 88, wherein the composition is a meat product.

90. The foodstuff of Claim 89, wherein the meat product is a beef product, a pork product, or a poultry product.

91. The foodstuff of claim 90, wherein the meat product is veal, lamb, sheep, goat, elk, deer, antelope, horse, or dog.

92. The foodstuff of claim 88, wherein the foodstuff comprises a surface and/or flesh of a marine or freshwater aquatic organism.

93. The foodstuff of claim 92, wherein the aquatic organism is a fish, mollusk, or crustacean.

94. The foodstuff of claim 88, wherein the foodstuff comprises a vegetable foodstuff.

95. The foodstuff of claim 88, wherein said foodstuff is a packaged foodstuff.

96. A method of inhibiting the growth and/or adhesion of a microbial species on a foodstuff, comprising:

treating a food-contacting surface of a material for food packaging or food handling with an

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isolated lactoferrin immobilized on a naturally occurring substrate via the N-terminus region of the lactoferrin; and contacting a foodstuff with said surface, whereby the growth and/or adhesion of a microbial species on said foodstuff is inhibited.

97. The method of Claim 96, wherein said food packaging or handling material is a cellulosic polymer.

98. The method of Claim 96, wherein said food packaging or handling material is paper, wood, or cardboard.

99. The method of Claim 96, wherein said food-contacting surface comprises a surface belonging to a shear wrap, a cellophane, a wrapping paper, a waxed paper, a bag, a carton, a box, a tray, a plate, a bowl, a food storage vessel, a serving dish, a cup, a bin, a jar, or a bottle.

100. The method of Claim 96, wherein said food-contacting surface comprises a surface belonging to a glove, a mitt, a fork, a spoon, a knife, a slicer, a tong, a ladle, a scoop, a cup, a processor, a juicer, a grinder, a press, a hook, a chipper, a peeler, a cutter, a screw, an opener, a chute, a spatula, a cutting board, a kneading board, a rack, or a shelf.

101. A food container or food-handling implement, said container or implement having a food-contacting surface, said surface treated with an isolated lactoferrin immobilized on a naturally occurring substrate via the N-terminus region of the lactoferrin in an amount effective to inhibit the growth and/or adhesion of a microbial species on said surface.

102. The food container or food-handling implement of Claim 101, wherein said container or implement is a shear wrap, a cellophane, a wrapping paper, a waxed paper, a bag, a carton, a box, a tray, a plate, a bowl, a food storage vessel, a serving dish, a cup, a bin, ajar, a bottle, a glove, a mitt, a fork, a spoon, a knife, a slicer, a tong, a ladle, a scoop, a cup, a processor, a juicer, a grinder, a press, a hook, a chipper, a screw, a cutter, a peeler, an opener, a chute, a spatula, a cutting board, a kneading board, a rack, or a shelf.

103. The food container or food-handling implement of Claim 101, having an amount of a between about 0.0001 to about 10 mg /square inch of said food-contacting surface.

104. An antimicrobial cleanser, polish, paint, spray, soap, or detergent for applying to an inanimate surface, containing an isolated lactoferrin immobilized on a naturally occurring substrate via the N-terminus region of the lactoferrin in an amount effective to inhibit the growth and/or adhesion of a microbial species on said surface.